

United States of America

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

WRC-07 Agenda Item 1.8 (Res. 145 (WRC-03) only): *to consider the results of ITU-R studies on technical sharing and regulatory provisions for the application of high altitude platform stations operating in the bands 27.5-28.35 GHz and 31-31.3 GHz in response to Resolution 145 (WRC-03), and for high altitude platform stations operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz in response to Resolution 122 (Rev.WRC-03);*

ISSUE: Identifying a common 300 MHz segment of the band 27.5-28.35 GHz, paired with the 300 MHz band at 31-31.3 GHz, for use by HAPS in the countries listed in Nos. **5.537A** and **5.543A** or countries in Region 2 planning provisional operation, taking into account the requirements of other fixed-service systems and other services, and resolving outstanding future conference related issues.

Resolution 145 (WRC-03)

"Potential use of the bands 27.5-27.8 GHz and 31-31.3 GHz by high altitude platform stations (HAPS) in the fixed service"

Background Information:

Resolution 145: WRC-2000 decided to adopt provisions for the operation of HAPS on a non-interfering/non-protected basis in the bands 27.5-28.35 and 31-31.3 GHz in Region 3, but did not allow operation in the entire bands until studies could be completed to determine how best to protect existing services in these and nearby frequency bands. WRC-03 further refined these provisions by deciding to limit HAPS operation to 300 MHz in a specified direction in each of these two bands, retaining the requirement for HAPS to operate on a non-interfering/non-protected basis in these 300 MHz segments, and adopting Resolution **145 (WRC-03)**, which created the possibility of allowing Region 2 administrations to advise the Radiocommunications Bureau of their intent to implement HAPS systems within the bands 27.5-28.35 and 31-31.3 GHz. Administrations intending to implement HAPS in these bands are to seek the explicit agreement of concerned administrations in accordance with *resolves* 4 of this Resolution.

Under Resolution **145 (WRC-03)**, the use of HAPS within the fixed-service allocations within the 27.5-28.35 GHz and 31-31.3 GHz bands must be limited to 300 MHz in each band, and is subject to the condition that such use must not cause harmful interference to, nor claim protection from, other stations of services operating in accordance with the

Table of Frequency Allocations of Article 5. Furthermore, the Resolution specifies that that the development of these other services shall proceed without constraints by HAPS operating pursuant to the Resolution. This Resolution also calls for the identification of a common 300 MHz within the 27.5-28.35 GHz band for use by HAPS. With respect to the band 31-31.3 GHz, Resolution **145 (WRC-03)** specifies that systems using HAPS in Region 2 in the band 31-31.3 GHz must not cause harmful interference to the radio astronomy service having a primary allocation in the band 31.3-31.8 GHz, taking into account the protection criterion given in Recommendation ITU-R RA.769. The Resolution contains limits on the level of unwanted power density into the HAPS ground station antenna in the band 31.3-31.8 GHz in order to ensure the protection of satellite passive services.

Proposal:

USA/1.8/A

MOD

5.537A In Bhutan, Korea (Rep. of), the Russian Federation, Indonesia, Iran (Islamic Republic of), Japan, Kazakhstan, Lesotho, Malaysia, Maldives, Mongolia, Myanmar, Uzbekistan, Pakistan, the Philippines, Kyrgyzstan, the Dem. People's Rep. of Korea, Sri Lanka, Thailand and Viet Nam, the allocation to the fixed service in the band 27.5-~~27.88.35~~ GHz may also be used by high altitude platform stations (HAPS). ~~The use of HAPS within the band 27.5-28.35 GHz is limited, within the territory of the countries listed above, to a single 300 MHz sub-band.~~ Such use of 300 MHz of the fixed-service allocation by HAPS in the above countries is further limited to operation in the HAPS-to-ground direction and shall not cause harmful interference to, nor claim protection from, other types of fixed-service systems or other co-primary services. Furthermore, the development of these other services shall not be constrained by HAPS. See Resolution **145 (Rev.WRC-073)**.

Reason: WRC-03 called for the identification of a common 300 MHz band, within the 27.5-28.35 GHz band, for use by HAPS in those countries wishing to implement such service. Such identification will help to ease the implementation and harmonization of HAPS in those countries. Identifying the lowest 300 MHz segment for potential use by HAPS maximizes the amount of contiguous FSS spectrum in the 27.5-30.0 GHz band that would not be constrained domestically in any way as a consequence of any potential use of the band by HAPS.

USA/1.8/B

MOD

5.543A In Bhutan, Korea (Rep. of), the Russian Federation, Indonesia, Iran (Islamic Republic of), Japan, Kazakhstan, Lesotho, Malaysia, Maldives, Mongolia, Myanmar, Uzbekistan, Pakistan, the Philippines, Kyrgyzstan, the Dem. People's Rep. of Korea, Sri

Lanka, Thailand and Viet Nam, the allocation to the fixed service in the band 31-31.3 GHz may also be used by systems using high altitude platform stations (HAPS) in the ground-to-HAPS direction. The use of the band 31-31.3 GHz by systems using HAPS is limited to the territory of the countries listed above and shall not cause harmful interference to, nor claim protection from, other types of fixed-service systems, systems in the mobile service and systems operated under No. **5.545**. Furthermore, the development of these services shall not be constrained by HAPS. Systems using HAPS in the band 31-31.3 GHz shall not cause harmful interference to the radio astronomy service having a primary allocation in the band 31.3-31.8 GHz, taking into account the protection criterion as given in Recommendation ITU-R RA.769. In order to ensure the protection of satellite passive services, the level of unwanted power density into a HAPS ground station antenna in the band 31.3-31.8 GHz shall be limited to -106 dB(W/MHz) under clear-sky conditions, and may be increased up to -100 dB(W/MHz) under rainy conditions to take account of rain attenuation, provided the effective impact on the passive satellite does not exceed the impact under clear sky conditions given above. See Resolution **145 (Rev.WRC-073)** (WRC-073)

Reason: Consequential to the changes to Resolution **145** in **USA/1.8/C**

USA/1.8/C

MOD

RESOLUTION 145 (Rev.WRC-073)

**Potential use of the bands 27.5-27.88.35 GHz and 31-31.3 GHz
by high altitude platform stations (HAPS)
in the fixed service**

The World Radiocommunication Conference (Geneva, 20073),

considering

- a) that WRC-97 made provision for the operation of HAPS, also known as stratospheric repeaters, within a 2×300 MHz portion of the fixed-service allocation in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;
- b) that WRC-97 adopted No. **4.15A** specifying that transmissions to or from HAPS shall be limited to the bands specifically identified in Article **5**;
- c) that at WRC-2000, several countries in Region 3 and one country in Region 1 expressed a need for a lower frequency band for HAPS due to the excessive rain attenuation that occurs at 47 GHz in these countries;
- d) that ~~at the present Conference,~~ some countries in Region 2 have also expressed an interest in using a frequency range lower than those referred to in *considering a*);

- e) that, in order to accommodate the need expressed by the countries referred to in *considering c)*, WRC-2000 adopted Nos. **5.537A** and **5.543A**, which were modified at WRC-03 and then again at WRC-07 ~~this Conference~~ to permit the use of HAPS in the fixed service ~~within 300 MHz of spectrum~~ in the band 27.5-27.88.35 GHz and in the band 31-31.3 GHz in certain Region 3 countries and in one Region 1 country on a non-harmful interference, non-protection basis;
- f) that the bands 27.5-27.88.35 GHz and 31-31.3 GHz are already heavily used or planned to be used by a number of different services and a number of other types of applications in the fixed service;
- g) that while the decision to deploy HAPS can be taken on a national basis, such deployment may affect neighbouring administrations, particularly in small countries;
- h) that the 31.3-31.8 GHz band is allocated to the radio astronomy, Earth exploration-satellite (passive) and space research (passive) services, and that WRC-03 ~~this Conference~~ amended No. **5.543A** to specify signal levels that would protect satellite passive services and radio astronomy stations;
- i) that ITU-R has conducted studies dealing with sharing between systems using HAPS in the fixed service and other types of systems in the fixed service in the bands 27.5-27.88.35 GHz and 31-31.3 GHz leading to Recommendation ITU-R F.1609;
- j) that results of some ITU-R studies indicate that, in the bands 27.5-27.88.35 GHz and 31-31.3 GHz, sharing between fixed-service systems using HAPS and other conventional fixed-service systems in the same area will require appropriate interference mitigation techniques to be developed and implemented;
- k) that ITU-R has conducted studies dealing with compatibility between systems using HAPS and the passive services in the 31.3-31.8 GHz band leading to Recommendations ITU-R F.1570 and ITU-R F.1612;
- l) that ITU-R has produced Recommendation ITU-R SF.1601 containing a methodology for evaluating interference from the fixed-service system using HAPS into GSO FSS systems in the band 27.5-27.88.35 GHz ~~in order to facilitate further studies~~;
- m) that HAPS technical ~~and regulatory~~ issues should continue to be studied in order to determine appropriate measures for protecting the fixed service and other co-primary services in the band 27.5-27.88.35 GHz;
- n) ~~that pending the completion of studies, administrations in Region 2 may wish to consider deployment of HAPS systems in the fixed service within 300 MHz of spectrum at 27.5-28.35 GHz and in 300 MHz of spectrum at 31-31.3 GHz and to have some provisional means by which to authorize such use of HAPS in their territories;~~

noting

~~that systems using HAPS may operate in the bands 27.5-28.35 GHz and 31-31.3 GHz under No. 4.4,~~

resolves

~~1 to invite WRC-07 to review the results of the studies specified below and consider appropriate refinement of the regulatory provisions for the use of HAPS within the bands 27.5-28.35 GHz and 31-31.3 GHz;~~

12 that, notwithstanding No. **4.15A**, in Region 2 the use of HAPS within the fixed-service allocations within the 27.5-~~27.88-35~~ GHz and 31-31.3 GHz bands shall ~~be limited, pending the completion of the studies specified in *invites ITU-R 1* below, to 300 MHz in each band, that such use shall not cause harmful interference to, nor claim protection from, other stations of services operating in accordance with the Table of Frequency Allocations of Article 5, and, further, that the development of these other services shall proceed without constraints by HAPS operating pursuant to this Resolution;~~

23 that, ~~pursuant to *resolves 2* above,~~ any use by HAPS of the fixed-service allocation at 27.5-~~27.88-35~~ GHz pursuant to *resolves 1* above shall be limited to operation in the HAPS-to-ground direction, and that any use by HAPS of the fixed-service allocation at 31-31.3 GHz shall be limited to operation in the ground-to-HAPS direction;

34 that, ~~on a provisional basis,~~ the administrations listed in Nos. **5.537A** and **5.543A** and those administrations in Region 2 which intend to implement systems using HAPS in the fixed service in the bands 27.5-~~27.88-35~~ GHz and 31-31.3 GHz shall seek explicit agreement of concerned administrations with regard to their primary services to ensure that the conditions in Nos. **5.537A**, **5.543A**, *resolves 12* and *resolves 45* are met;

45 that systems using HAPS in the band 31-31.3 GHz, in accordance with *resolves 12* above, shall not cause harmful interference to the radio astronomy service having a primary allocation in the band 31.3-31.8 GHz, taking into account the protection criterion given in Recommendation ITU-R RA.769. In order to ensure the protection of satellite passive services, the level of unwanted power density into the HAPS ground station antenna in the band 31.3-31.8 GHz shall be limited to -106 dB(W/MHz) under clear-sky conditions and may be increased up to -100 dB(W/MHz) under rainy conditions to take account of rain attenuation, provided that effective impact on the passive satellite does not exceed the impact under clear-sky conditions as given above,

invites ITU-R

~~1 to continue to conduct studies, as a matter of urgency, and taking into account the requirements of other fixed service systems and other services, on the feasibility of identifying a suitable and preferably a common 300 MHz segment of the band 27.5-28.35 GHz paired with the 300 MHz band at 31-31.3 GHz, for use by HAPS in the countries listed in Nos. 5.537A and 5.543A or countries in Region 2 planning provisional operation;~~

~~12~~ to develop, one or more ITU-R Recommendations, technical sharing criteria or HAPS system design conditions that are necessary to ensure that HAPS applications in the fixed service operate successfully on a non-harmful interference, non-protected basis in the bands ~~27.5-27.88.35~~-GHz and 31-31.3 GHz;

~~23~~ to complete studies on the interference criteria and methodology for evaluating interference from the downlink (HAPS-to-ground direction) of systems using HAPS to the uplink of the GSO satellite networks in the FSS within the band ~~27.5-27.88.35~~-GHz, taking into account Recommendation ITU-R SF.1601 for the situations referred to in *considering l*);

~~4~~ to study the regulatory provisions that might be needed in order to address those cases where the deployment of HAPS in the fixed service in the bands ~~27.5 28.35~~ GHz and ~~31 31.3~~ GHz in the territory of one administration may affect other administrations;

~~35~~ to continue to carry out studies on the appropriate interference mitigation techniques for the situations referred to in *considering j*),

invites administrations,

to advise the Radiocommunications Bureau of their intention to implement HAPS systems within the band ~~27.5-27.88.35~~ GHz and in the band 31-31.3 GHz, whether in countries listed in Nos. **5.537A** and **5.543A** or in accordance with *resolves 12*, and to specify the technical characteristics of the systems they intend to implement frequency bands (up to 300 MHz each with the ~~27.5 28.35~~ GHz and ~~31 31.3~~ GHz bands) they intend to use for such systems.

instructs the Radiocommunications Bureau,

to publish in the International Frequency Information Circular (BR IFIC) a list of administrations who have so advised, and to publish the information on HAPS implementation received from administrations which intend to implement systems using HAPS in the fixed service in the bands ~~27.5-27.88.35~~-GHz and 31-31.3 GHz.

Reason: Changes to frequency ranges throughout, deletion of *invites 1*, and other minor changes are consequential to proposal **USA/1.8/A**. Deletion of *noting* is made recognizing that this is a simple statement of fact. Deletion of *invites 4* is made recognizing the retention of old *resolves 4*, now *resolves 3*. Changes to *invites administrations* are proposed to clarify that administrations are to supply technical details of their systems along with an indication of their intention to implement HAPS in these frequency bands.